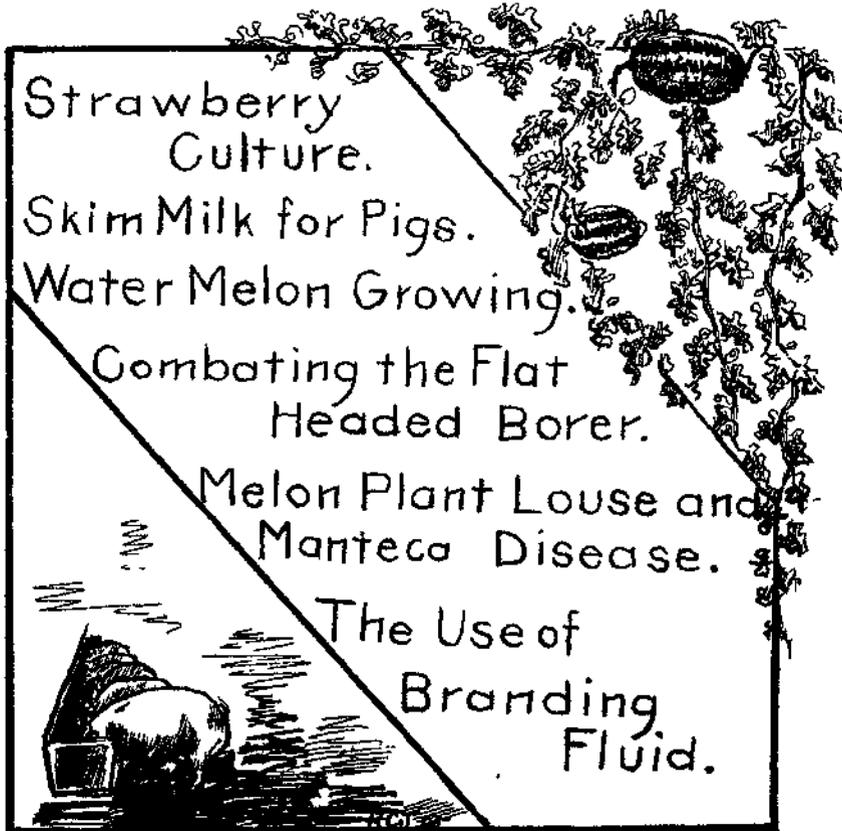


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Timely Hints for Farmers.

Collected, Edited and Illustrated.

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Tucson, Arizona, November 28, 1903.

**UNIVERSITY OF ARIZONA**  
**AGRICULTURAL EXPERIMENT STATION**

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Samples of water, fertilizers, etc., which are of agricultural interest, and which are sent with full information, are analyzed free of charge as time permits.

The Bulletins, Timely Hints, and Reports of this Station will be sent free to all who apply. Kindly notify us of errors or changes in address, and send in the names of your neighbors, especially recent arrivals, who may find our publications useful.

Address,

**THE EXPERIMENT STATION,**

Tucson, Arizona.

## TIMELY HINTS FOR FARMERS.

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### STRAWBERRY CULTURE.

No. 42, OCTOBER 20,

The culture of strawberries has been attended with many difficulties in Arizona during the past three years. The hot, dry summers with a scant supply of irrigating water have been very difficult ones through which to carry young plants the first season after setting. It is hoped, however, that by improved methods of culture and by a better knowledge of varieties, strawberry culture may again be as profitable as it formerly was, especially if the hoped-for moister seasons return.

*The Soil and its Preparation:* While strawberries will grow in a great variety of soils, they prefer a sandy loam. It is especially important in this region that the soil be not of such a nature that it will bake when dry, and that it be as nearly free from alkali as practicable. Some varieties do better in the heavier soils of the Valley, while others prefer those that are quite sandy.

In preparing the soil, the first step of importance is to carefully level the area to be devoted to strawberries. Work spent in leveling before the plants are set will cause the saving of much labor and an increase of returns that few who have not had experience can realize. The piece selected should have a gentle slope, or should be so leveled as to slope slightly in one direction only, if possible. In preparing the land for setting the plants, two different methods are pursued by different growers. Some make large furrows with intervening ridges, and by connecting alternate ends of the furrows, make endless ditches. This method is best adapted to a hill-side, or to a plat on a steep grade. On land that is level, or nearly so, it is better to make comparatively shallow open furrows extending in the direction the piece is to be irrigated. For irrigating the plants most successfully, the rows should be 12 to 20 rods long.

*Varieties:* But few varieties of strawberries have been grown extensively in southern Arizona. The two most commonly cultivated are the Arizona Ever-bearing and Michel's early. The Ever-bearing succeeds best on heavy soil, while the Michel succeeds best on more sandy soil. The Michel is an early berry, producing the majority of its crop before June. It also endures more heat and drought than the Ever-bearing, and will often withstand trying conditions that will destroy the latter. At the Experiment Station during the past year about thirty other varieties have been tested. Few of them have proven satisfactory. Some of them died during winter, and the majority of them succumbed to the heat and drought of the past summer. One gives promise of being useful in the Valley—the Excelsior. Like the Michel it is an early berry, but the fruit is of better quality than the Michel, has a better color, and is larger. The plants do not endure heat and drought quite as well as the Michel, but equally as well as the Ever-bearing.

*Time of Setting:* Strawberries are set in southern Arizona during two seasons, either during the early part of November, or during February. Some seasons they do best set in the fall; other seasons they do best if set during the winter. If the winter following the fall setting be a trying one, the plants are apt to be injured before they get well established. It is usually safe to set plants during February, although they will not get as good a start before the warm weather of summer, as the fall-set plants will, if the winter is favorable.

*Method of Setting:* Judging by our experience at the Experiment Station farm, strawberries do best set on the margin of furrows made in the manner mentioned above. Previous to setting, water should be run through the furrows, and when the soil is sufficiently dry, the plants should be set 12 to 18 inches apart a short distance above the water line. For setting them we have found a common garden spade to be a very useful tool. Holes are made by pressing the spade into the soil, the plants are placed in one side of the opening thus made, and the soil pressed about them with the spade or by stamping with the foot. Immediately after setting the plants, water should be run through the furrows

to settle the soil about the plants and leave them in moist soil.

*Irrigation and Cultivation:* Subsequent to setting, the plants need to be irrigated sufficiently frequently to prevent them withering, and keep them growing and in fresh condition. The frequency of irrigation will depend upon the season of the year and the nature of the weather. During the cooler, moister part of the year, irrigation of young plants once in eight to twelve days will be sufficient. During the warmer and drier parts of the year they need to be irrigated twice as frequently. Mulching the young plants with fine straw about the middle of June will aid very much in keeping them in good condition during the summer. The straw will check the flow of water through the furrows, cause it to be absorbed by the soil, and will retain the moisture for many days after irrigation. It will also lessen the effect of alkali that might otherwise accumulate on the surface of the soil about the plants in sufficient quantities to injure them. In most cases it is best to keep the strawberry patch free from weeds, as the latter not only removes plant food, but moisture from the soil. In some cases where weeds produce much shade, without encroaching too closely on the plants, they may furnish some protection from the intense heat of the sun. But as a rule, strawberries should be cultivated throughout the summer.

Until the young plants are well established, all blossoms that appear should be promptly removed; and they will endure heat and drought better, if all the runners are kept off them during at least the early part of the summer. Young plants struggling to keep alive during trying weather, cannot at the same time produce fruit or runners without endangering their lives. After the first season the plants will need less attention, and may be permitted to fruit and to produce runners freely,

A. J. McCLATCHIE,

*Department of Agriculture and Horticulture.*

## SKIMMILK FOR PIGS.

No. 43, DECEMBER 15.

Too often the value of the so-called by-products of the farm is not fully realized by the farmer. The dairyman, for instance, whose first object is to produce as much milk as possible that he may sell the butterfat, may overlook the value still remaining in the skimmilk and buttermilk after the fat has been taken from them. As a matter of fact from 10 to 20 per cent of the value of milk lies in the skimmilk when it is properly fed to growing young animals. Below is given the average composition of milk and its by-products—skimmilk, buttermilk and whey—as given in Dr. Henry's work on feeds and feeding :

Kind of milk	fc a lb	Digestible nutrients in 100 pounds		
		Protein lb	Carbohydrate lb	Fiber lb.
Cows' milk	12.8	3.6	4.9	3.7
Skimmilk, gravity	9.6	2.1	4.7	0.8
Skimmilk, separator	9.4	2.9	5.2	0.3
Buttermilk	9.9	3.9	4.0	1.1
Whey	6.6	0.8	4.7	0.3

An examination of this table shows that skimmilk contains more than 75 per cent of its original solids,—an amount of solid matter equal to that in pumpkins and some of the root crops, and more valuable in its composition.

While butterfat has a much higher commercial value than the other solids in milk, it is less essential as a food for young animals than what remains, and may easily be replaced by a cheaper feed.

In some cases when milk is skimmed otherwise than by the use of a centrifugal separator the loss is much greater,—according to the above table one-half a pound more in a hundred pounds of milk. Where this loss is known the careless loser usually attempts

lately to justify his loss by saying that the calves and pigs get the butterfat anyway. He does not stop to think how much his calves or pigs would have to bring a pound to pay him butter prices—20 to 30 cents a pound—for his butterfat; nor does he stop to calculate how many sacks of barley he could buy with the proceeds from the sale of the 5 pounds of butterfat in every thousand pounds of skimmilk fed in a year. Buttermilk is a little better than skimmilk.

Whey, it will be seen, contains but little over one-half of its original solids; and the more valuable protein has gone into the cheese. Generally speaking, its feeding value is about half that of skimmilk, a difference, which with us I believe, is enough to pay the milk handler's bill.

A year ago at the Experiment Station farm we were feeding steers, four of which were fed grain hay and two of them had a small ration of rolled barley. We were selling our milk to a neighbor for less than the cost of hauling the milk to the factory because no money was available for the purchase of animals to which to feed it. So arrangements were made with a neighbor for a couple of pigs to feed "on shares." The pigs weighed 81 pounds each when they came to the farm. They followed the steers and were fed skimmilk. In 113 days they ate 6000 pounds of skimmilk, gained 248 pounds in weight and increased \$16.12 in value with pork at 6.5 cents a pound. They thus paid for their skimmilk at the rate of 26.8 cents per hundred. This is how your Station got its start in the pig business. Skim milk did it. During the year we have fed skimmilk to other pigs with the results set forth in the following table:

Number of pigs	Av. weight at beginning	Number of days fed	Total lbs. gained	Pounds of feed			Lbs. gained daily.	Lbs. skimmilk per pig daily	Gross cash return, *	Cost of barley fed †	Cash per cwt. of skimmilk.
				Skim milk	Barley.	Alfalfa					
2	80	34	100	1748	170	102	1.48	25.7	\$6.50	\$1.70	27.5c
2	80	34	90	2059		129	1.32	30.3	5.85		28.4
3	124	19	60	2134			1.05	37.4	3.90		18.2
1	210	49	66	1665		78	1.32	34.0	4.29	.78	21.1
2	81	113	248	6005	Followed steers fed barley and grain hay.		1.1	26.6	16.12		26.8

\* Pork @ \$6.50 per cwt. on foot. † Rolled barley @ \$1.00 per cwt.

In these trials no attempt was made to determine the best methods of feeding. The aim was simply to make a profitable use of the skimmilk under existing conditions. The milk was fed alone, with barley, with alfalfa, and with barley and alfalfa. There seem to be no bad results from feeding large quantities of milk though feeding it alone is not to be recommended. Grain need not necessarily be fed with it but there should be coarse feed of some kind.

It should be stated concerning the skimmilk fed by us that there has been no certainty as to its composition. At one time during the summer when our pigs were gaining less than half as much as we thought they should, it was found upon investigation that the creamery was sending us watered milk because it was easier to water it than to make a just division among the various patrons. This practice not only resulted in our financial loss and that of some other patrons, but it has lessened the value of results here presented, for we are unable to say that in all cases the milk was unadulterated. As it was, the cash received per hundred weight of milk fed was from 18.2 cents to 28.4 cents and we think that dairymen may safely calculate the value of skimmilk for pig feeding at 20 cents a hundred.

GORDON H. TRUE,

*Department of Animal Husbandry.*

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#### WATERMELON GROWING,

No. 44, JANUARY 25,

With a sufficient supply of irrigating water, watermelons are one of the surest crops grown in Arizona. From the middle of June until the frosts of November the market can be supplied from one or more parts of the Territory. Watermelon culture is not difficult, but there are certain points that need to be observed in order to get the best results. While the hints that follow are given more particularly for new settlers, it is hoped that the older growers may find something in them that will prove of value.

*The Soil and its Preparation:* Watermelons thrive in Arizona in a great variety of soils, but the sandy or clayey loams are preferable to heavy adobe or light, gravelly soils. Most soils in the agricultural sections of the Territory produce good crops of melons without fertilization, but the application of stable manure several months previous to planting increases the yield in most soils.

As is the case with most crops grown in our region, the first step to take in preparing the soil for a melon crop is to get the



Test plat of melons, Station farm, 1901.

surface of the field even. Labor spent in leveling will be amply repaid in the time saved in irrigating, and in the increased yield. During the winter previous to planting, the field should receive several heavy irrigations, that the soil may be wet to a depth of six to ten feet before it is plowed for crop. The plowing should be deep. Some time before the seed is to be planted, large furrows should be run six to eight feet apart in the direction across the field that will give a fall of about two inches per hundred feet.

The rows should be at least twenty rods long to irrigate well with little loss of waste water. Better a few long rows than many short ones.

*Varieties:* All varieties of watermelons thrive in Arizona, but some are decidedly more desirable and more profitable than others. The variety or varieties that should be planted will depend somewhat on the soil, but more especially on the purpose for which the melons are intended.

For an early melon, the most desirable variety we have tested at the Station farm is the Augusta. It is a greenish-white round or oblong melon that will make a start earlier in the spring than any other variety we have tested. It will germinate during weather too cool for the other varieties, and consequently may be planted earlier. It ceases to produce marketable melons earlier than most varieties. Near to the Augusta in earliness of starting and of producing ripe melons is the Alabama. This is a long melon, resembling the Florida very much in shape and color, the latter variety coming next to the Alabama in earliness. The Early Fordhook is a variety highly prized by some growers. Following the above is a great variety of melons with varying merits.

For a main crop, the Florida and the Rattlesnake are the ones most in favor in much of Arizona. The former is the earlier of the two, but is not usually as large as the latter. The Rattlesnake produces marketable melons longer than the Florida does, and is a somewhat better shipper. The Sweetheart is also grown much for a main crop. It is a large whitish melon that usually sells well, but the quality is not as good as that of the above two. The Blue Gem is also a large melon, green in color, that is quite satisfactory for the home market and for shipping. Besides the foregoing are many varieties, such as the Peerless, Lodi, Seminole, and the Dixie, that possess merits of various kinds. For home market and for family use the Kleckley Sweets is a very desirable variety.

For a late melon, the Chilean is an excellent variety, if grown in rich soil and given plenty of water. It was recently introduced from South America into California, where it has become very popular. In Southern Arizona it does not produce as

heavily as most of the other varieties mentioned, but the quality is excellent. The rind is thin but very hard, and the flesh solid and a deep crimson throughout. For home use and for shipping it is very satisfactory.

*Time and Method of Planting:* The time of planting will depend on the locality. Little is gained by putting the seed into the soil until the latter has become warm, and danger of frost is past. In the extreme southern portion of the Territory melons may be profitably planted early in March, in the south-central valleys, from the middle to the end of March, and in the north-central valleys in April. In Northern Arizona they cannot be safely planted until May or June. In Southern Arizona the Chilean planted during June gives a very satisfactory crop during September, the yield then being usually heavier than earlier in the season. Any variety may be planted at any time during the warm weather of spring and summer, the results that will be obtained depending on the time that fall frost occurs in the particular locality.

For convenience in cultivation it is better to plant melons in rows both ways. If across the furrows that have been mentioned above marks are made six to eight feet apart, and the hills placed at the intersection of the furrow and the marks, the rows will be in good shape for cultivation later. A few days before the seed is to be planted, water should be run through the furrows to moisten their sides. When they are sufficiently dry, the seed should be planted just at the upper edge of the water line and covered about an inch deep. An irrigation shovel is commonly used for the purpose.

*Irrigation and Cultivation:* If the soil was in proper condition when the seed was planted and the weather be favorable, the young plants will appear without any further irrigation. But if the soil becomes dry before germination is completed, it will be necessary to run water through the furrows in order to bring the seed up. After a stand has been secured, irrigation about once in two weeks, for a month or two, will be sufficient in most soils.

From the time that melons begin to set on the vines, an abundance of water is needed by them. There is not much danger

of giving them too much water in soil that drains well. The necessary frequency of the application will depend on the nature of the soil and the amount applied each time. The important thing is to keep the vines in a green, flourishing condition while they are producing melons. The size of the melons and the profits from a field will depend largely upon the amount of water the vines receive.

Until the vines begin to cover the ground, the field should be kept free from weeds by cultivation. Planting in rows both ways greatly facilitates this work. After cultivating the irrigating furrows up, they should be made afresh for the next irrigation, running them a little further from the roots of the plants each time. After the last cultivation that is possible, as the vines push out over the intervening spaces, a furrow may be run on each side of the row about two feet distant, for future irrigation,

*Marketing the Crop:* The first essential of a marketable watermelon is that it be at the proper stage of ripening—neither under-ripe or over-ripe. At the beginning of the melon season, the tendency is to pick and market unripe ones. This injures their sale, and all growers suffer from the effects of undue haste to get melons upon the market while prices are high. Of first importance is the ability to distinguish upon the vines between green and ripe melons; then, if one is conscientious in picking only the fully ripe ones, there need be little fear of loss from green ones.

Most varieties give forth a distinctly different sound when ripe and when green. The greener the melon, the sharper and more metallic is the ring that it gives forth if snapped with the finger. As the melon matures and becomes less solid, it gives forth a somewhat hollow or distinctly muffled ring. The riper the melon, the more nearly the sound given forth will be like that produced when the palm of the hand is snapped with a finger. Some varieties will be ready for market while the melons still give forth a somewhat metallic sound, while others must be left on the vines until the sound is quite a "dead" one. These are matters that can soon be learned by experience. The writer knows by long experience that if proper precaution is taken and

a doubtful melon cut occasionally, there is little excuse for ever putting a green melon upon the market.

As the season advances and melons are ripening rapidly, the tendency is to let some of them become over-ripe before they are marketed. At this time it is safe to pick a melon with a sharper ring than would be pronounced ripe earlier in the season. Over-ripe melons do not ship or keep well, and are consequently decidedly objectionable to dealers.

A. J. McCLATCHIE,

*Department of Agriculture and Horticulture.*

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### COMBATING THE FLAT-HEADED BORER.

No. 45, MARCH 1.

The destructive tree borer so well known to horticulturists as the Flat-headed apple tree borer and to entomologists as *Chryso-bothris femorata* has become sufficiently established in some parts of Arizona to demand attention. Our region has remained remarkably free from injurious insects; but during the past two years at least the above named borer has done much to hasten the death of full-grown orchard trees that have been injured by heat, and has destroyed many newly-set ones. Last summer several young apple and plum trees were killed by it at the Station farm before its presence in them was suspected, and others report the loss of young trees as a result of its depredations. Examination of large peach, plum and quince trees that appeared to be dying from the effects of the sun revealed the presence of the borer in most cases.

This insect is found in all parts of the country and annually destroys vast numbers of trees. It attacks apple, pear, quince, plum, peach, cherry, ash, elm, maple, box-elder, sycamore and willow trees.

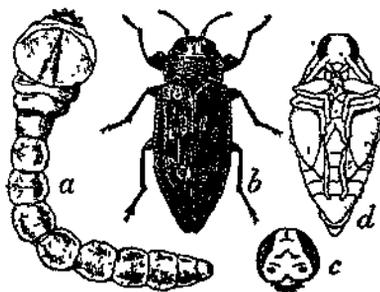
The injury is done by the flat-headed borer during its grub or larval stage. The adult insect is a beetle about half an inch long, flattish-oblong in form, shiny greenish-black above and cop-

per colored below. The female deposits her eggs in the crevices of the bark of the trunk and main branches, usually on the south or southwest side, where the effect of the sun upon the trees is greatest. In our locality the most of the eggs are probably laid during April and May. Although eggs are sometimes deposited by this insect upon healthy, well-established trees, it evidently prefers to select sickly or newly transplanted ones, especially those whose bark has been injured by exposure to the sun.

The eggs hatch within a few days after being deposited. The young larva soon eats through the bark and proceeds to bore at some depth beneath the surface, leaving behind it a flattened channel. Sometimes a single borer will girdle a tree and cause its death. The larva reaches its full growth by the end of the summer, being then a pale-yellowish grub about half an inch long, with a broad, flat head. During the winter it remains quiescent. The next spring it bores out nearly through the bark, then moves back a little and undergoes its change into the adult beetle form, the transformation being complete in about three weeks. The beetle then cuts an opening through the bark and escapes to continue the work of destruction begun by its ancestors. During the warm part of the day it may be seen flying about in the hot sunlight.

There are three ways of combating the borer : (1) by destroying the grubs while they are at work in the tree, (2) by the application of some substance that will prevent the eggs being deposited or will destroy the eggs and newly-hatched larvæ, and (3) by wrapping the trees with something that will prevent the females gaining access to the bark.

But, by the best methods known, borers are difficult insects to combat. The larvæ make their way into the wood so soon after the eggs are deposited and



FLAT-HEADED BORER.  
a, larva; b, adult; c, head of male; d, pupa all enlarged. (After Chittenden.)

keep so completely out of sight as they work, that they may do much injury before their presence is suspected, and are difficult to kill when detected. It is a case where an ounce of prevention is most decidedly more effective and more economical than a pound of cure.

When the borers have entered the tree, they may be destroyed by cutting them out or by killing them in their burrows with a pointed wire, if they are not too deep or too far from the point of entrance. In some cases, where they cannot be reached with a wire or cut out without seriously injuring the tree, they may be killed by pouring kerosene or hot water into their burrows. The location of a borer is usually indicated by a slight discoloration and flattening of the bark and by the exudation of sap.

A great variety of washes have been used for preventing the female beetles from laying their eggs upon the trees. The following is probably as effective as any that can be safely used without danger of injury to the bark: Dissolve one-half gallon of soft soap or five pounds of whale-oil soap in half a gallon of hot water, and add a half pint of carbolic acid. When mixed, add five gallons of warm water and enough lime to make a whitewash of about the consistency of paint. Finally, stir in one-fourth of a pound of Paris green. Apply the wash in April before the eggs have been deposited on the trees and again in a few weeks. All cracks and crevices must be filled and the bark thoroughly and completely covered, a stiff brush being best for the work. It must be understood that the work has no effect upon the borers after they have once entered the tree, but is intended to prevent the depositing of the eggs, or to kill newly-hatched larvæ before they have entered the bark.

But the use of something that will not only protect the trees from the attacks of the borers, but from the heat of the sun, is more useful and economical than a simple wash. As has been stated, the parts of trees injured by heat are more liable to the depredations of borers than the healthy, uninjured portions. Therefore, anything that will prevent "sun-scald" and will at the same time keep off insects will be a double benefit to the tree.

A very effective, and at the same time inexpensive, cover for the trunks and main branches is one of newspapers or wrapping paper. If several thicknesses of paper are wrapped about the trees, beginning a little below the surface of the soil, and then tied with a weak string that will not cut the tree as it grows, ven effective protection is secured. It is important that there be no openings that would admit beetles. Drawing some soil about the base of the wrapper will close it at the bottom, and seeing that the wrapper fits closely at the top will prevent entrance at that point. Instead of the paper, wrappers of thin, flexible sheets of wood, such as are used in basket making may be used. The bottom may be closed with soil and the top with cotton wool. Either wrapper will protect trees from the injurious effect of the sun.

It is important that all young trees be protected in the future, especially during the first season. Failure to take this precaution may result in the loss of the most of the trees of a young orchard. Even if there were no danger from borers, it would be advisable to put on the wrappers of paper or wood to protect young trees from the sun. If the trunks are artificially protected until the branches have extended far enough to shade them, much more vigorous orchard trees will be secured. In this connection, it may be well to call attention to the importance of heading trees low, that the trunks may be better shaded by the tops.

A. J. McCLATCHIE,

*Department of Agriculture and Horticulture.*

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#### THE MELON PLANT-LOUSE AND THE "MANTECA" DISEASE.

No. 46, APRIL 15.

During the past year the melon **plant-louse**, which causes the so-called "**manteca**" disease of the watermelon and other **Cu-**curbitous **vines**, has been the subject of considerable correspondence. In many instances the melon crop has **been** reduced **one-**

half to two-thirds in quantity, besides being greatly impaired in quality. From observation and correspondence it appears that this insect prefers watermelon vines to those of other Cucurbits, though it is by no means uncommon on muskmelon, cucumber, and squash vines. The melon plant-louse has also been observed feeding on alfalfa, silver-leaved horse-nettle, ground-cherry, pig-weed, purslane, mustard, morning-glory, and evening primrose, also on several species of Amaranths and saltbushes growing in and about melon patches. The wingless form of this plant-louse was found on the flowering stems of shepherd's purse about Tucson during the present winter. From the above it is seen that the species feeds on a large number of our common plants in addition to the Cucurbits, and that at least under favorable conditions it can endure our winters.

The life-history of the species is in brief about as follows : Winged males and females are developed in the late fall, at which time the eggs are deposited on weeds and other plants that will afford nourishment in the early spring ; with the return of warm days the eggs hatch, and the young, with those plant lice which have wintered over, multiply rapidly ; by means of winged forms which appear in abundance at this time, the species is transferred from the weed patches and other situations to the melon fields. In the course of a few days these winged forms on the melon vines become surrounded with small colonies of wingless forms, their offspring, which, like their winged mother, continue to multiply rapidly by bringing forth their young alive, frequently several a day. In the meantime the winged insect has left for other parts of the patch to start more colonies.

Unless the melon-grower makes frequent examination of the condition of his vines, the first indication to him of the presence of this pest in his melon field is the characteristic wrinkling or curling of leaves, usually those at the center of the hill. This peculiarity results from the melon-louse feeding from the lower surface of the leaf, thus exhausting the sap as well as killing the cells in that portion. At this time also, or sometimes a little later, the excretion of enormous quantities of honey-dew—the “*man-teca*” of the Mexicans—becomes noticeable, the vines, the ground,

and even the fruits at times being covered over with the sweetish, oil-like liquid. It is this sweet fluid—the honey-dew—that so greatly attracts the flies and ants; and, generally speaking, the presence of numerous ants running to and fro on the vines can be taken as an indication of the occurrence of the melon aphid somewhere in the immediate vicinity.

It is a common practice among Mexicans and other melon-growers to destroy, by burning or burying, the "lousy" hills wherever found. The uselessness of this treatment is apparent when we examine the melon hills immediately adjacent to the ones badly infested, for we find them well-stocked with plant-lice. Though they may show no signs of the leaf-curl or of the honey-dew, they are, nevertheless, veritable centers of infection, and are just as dangerous to the field as the hill, the vines of which are ready to die. From the points of infection the spread is rapid if conditions are favorable, and in the course of ten days or two weeks an entire field may be uniformly infested from a few starting points. As the attacked leaves become withered winged forms are developed, which make their way to neighboring hills and fields. These winged forms were observed last year early in June, and continued more or less during the growing season.

The "lousy" hills referred to above can be treated effectively as will be described later, and with a little extra care they may be made to outgrow the attack and bear melons.

Since these melon aphids feed upon a large variety of plants, including many of our common weeds, in addition to the Cucurbitaceous vines, clean cultivation is of prime importance. Clean cultivation will do much to lessen their chances of rapid development in the early spring, and it may do away with them entirely for the year. Also, at the close of the season, all weeds, vines, and other trash in the field, together with the weeds growing on waste lands in the vicinity of melon patches, should be raked in piles and burned. If the land is covered with a growth of young plants in the fall, it should be plowed deep before winter, so as to destroy all weeds and other plants that are likely to harbor plant-lice or their eggs.

As soon as the young vines get four or six leaves they should be carefully and frequently examined for plant-lice, and at the first appearance of the winged forms they should be fumigated with carbon bisulphide. It has been shown here and elsewhere that carbon bisulphide will kill the melon-lice without injuring the vine. It is a matter of great importance that these winged plant-lice be destroyed as they come in from the surrounding vegetation, before they have had time to establish large colonies. In order to combat this insect most successfully a mutual action is desirable. One negligent neighbor may be as great a menace to a melon-growing community as a "lousy" melon hill is to a thriving patch.

The method of fumigation consists in covering the young vines with tight boxes or other covers twelve to eighteen inches in diameter, and introducing under each box a vessel containing one or two teaspoonfuls of carbon bisulphide. One teaspoonful should be allowed for every cubic foot of space under the cover, and this will easily kill all the plant-lice in three-quarters of an hour, though it will do no harm to leave the cover in place for an hour. A cheap tin cup, a clam-shell, a saucer, or other open dish will answer to hold the carbon bisulphide. It is very desirable that the cover should fit snugly to the ground, either being pressed into the soil a little or having the loose earth pressed against its lower edge; otherwise the heavy vapors will escape from below and not fill the space above. Satisfactory covers may be made from gasoline cans cut in two, each half answering for one cover; or boxes may be made from wood or paper; or, as suggested by the New Jersey Experiment Station, two barrel hoops may be used, one hoop being cut in two, and the two halves being crossed so as to make a dome-shaped frame-work over which heavy paper or cheap muslin (the latter dipped in linseed oil) may be tacked and pasted and the cover thus made practically tight. With fifty or a hundred of these covers a field can be treated quite rapidly.

It may be desirable to say a few words about carbon bisulphide. It is a colorless, volatile liquid with a disagreeable odor. Its vapor is heavy and about as inflammable as that of gasoline, a

spark from a cigar or pipe being sufficient to ignite it. It is, however, no more dangerous in this respect than gasoline. The vapor is also very poisonous to all animal life, but no one need fear inhaling small quantities of it in the open air. As purchased at drug stores, carbon bisulphide is rather expensive; but if bought in fifty-pound lots it can be secured for about ten cents a pound. A grade known as "fuma carbon bisulphide" is manufactured by Mr. Edward R. Taylor, Cleveland, Ohio. This is much cheaper than the ordinary carbon bisulphide and at least as efficient. If two teaspoonfuls of the "fuma" bisulphide are used to the hill, the cost of the material will be less than one cent a hill.

It sometimes happens that vines become infested a second time with aphids after they are too large to be fumigated. This condition, which is due to incomplete fumigation or to a second flight of the insects, can be best controlled by excessive irrigation. An abundance of moisture with ordinarily rich soil means an abundance of food-supply which will greatly assist the plant to outgrow the attack. The prevailing hot weather at this time, which is favorable for the growth of melon vines, is unfavorable for the rapid multiplication of plant-lice. Also the numerous enemies, chief of which are the lady-bugs, are usually more than able to hold the pest in check during the summer months. Lady-bugs are hemispheric in form and about the size of a half-pea; the commoner species are yellow or red with black spots on the wing covers. The larvæ of these insects, which are small flattened grubs of a bluish or a blue-black color, devour the aphids even more rapidly than the adult forms.

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#### THE USE OF BRANDING FLUID.

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In the fall of 1899, there were references in some of the agricultural papers to the use in New Zealand and Australia of a branding fluid which gave a legible brand but did not lessen the

value of the hide for tanning purposes. In response to a letter of inquiry, the writer received the following communication from the registrar of brands for Queensland, Australia: "A liquid branding material has been patented in New Zealand under the commercial designation of 'Gibson's Branding Fluid.' I submitted it to a severe test in this colony in February last, but although the brands imprinted by its means were legible, it was found that when the animals were slaughtered, and the hides tanned, the leather was injured to an extent almost equal to that which had been fire-branded. The patentees still hope to perfect it so that the hair will be completely removed without injury to the true skin."

In this issue of January 9th, 1901, the Breeders Gazette of Chicago called attention in its editorial columns to a combination of chemicals which it was claimed would take the place of the hot iron in branding cattle. Reports of the successful use of the fluid were said to have come from New Zealand, though conflicting reports as to its usefulness were received from western cattlemen. The chief advantage claimed for its use was that the value of the hide of the branded animal was not lessened for tanning purposes. The article in the Gazette appeared but one year later than the receipt of the letter from the registrar of brands in Australia. The composition referred to "consists of equal parts of barium sulphide and coal tar, which is preferably thinned by a mixture of American potash and water in equal parts by measure, and of spirits of turpentine, each equal in measure to the original composition."

A quantity of the mixture was prepared for the writer by the Station chemist. Two calves were treated as directed by dipping an ordinary branding iron into the well mixed liquid and pressing it firmly against the skin of the animal. The result was that on neither animal was there a scab formed over the attempted brand. The letters of the brand could not be made out even after clipping the hair.

Thinking to improve on the method suggested, a wooden form was made resembling the branding iron but with much wider faced letters—nearly one-halfinch instead of three-sixteenths. So far as the application of fluid was concerned, this appeared to

work much better than the iron. Heavy scabs were formed over the whole surface of the brand and it looked as though the operation had been a success. Upon the shedding of the scabs however, hair grew over a part of the brand leaving only detached bare spots.

Hon. Will C. Barnes, of Dorsey, New Mexico, formerly an Arizona cattleman, has used this same branding fluid under range conditions and expresses himself concerning its use as follows

“For the man who like myself has from two to three hundred calves to brand at a time, I can see no way of using it successfully.

In branding time on my ranch we usually cut out from two to three hundred calves, put them into a lane in the corral, cutting calves into one pen and cows into another. One man grabs the calf by the right hind leg, another grabs the tail, gives a quick jerk and the calf is on his side with one man holding his hind legs and another on his neck. No sooner does he hit the ground than a man is at him with the iron while at the same time another man marks and castrates, and this year a third man dehorned with a clipper. With two pairs of men to throw, one to run the irons, one to cut and mark, and one to dehorn, making seven men in all, we have frequently branded out ninety calves in an hour and kept it up at that clip for three or four hours.

Now I tried the branding fluid under such conditions I first put it into a milk-pan and used a cold iron. It took a long time for the fluid to penetrate the hair, and finally one vigorous calf kicked over my pan and spilled the fluid all over the legs of the man holding him. That settled the pan system and I got a brush and painted it on. That worked all right but took time. But the worst feature of all was that crowding three or four hundred calves into a small pen that way, they smeared and rubbed the stuff all over each other, the sides of the corral and the men's clothes.

Branding time on a big ranch is a hurry-up period. Everything is in a rush. To use the fluid means to take just about ten times as long as by the hot iron system.’’

From the foregoing it would seem that up to January, 1900, a successful branding fluid was not known in New Zealand or Australia, and that the so-called New Zealand branding fluid, the use of which has since been advocated in this country, is not to be depended upon for quick, accurate work. None of the animals branded by us have been slaughtered. There is a question still as to whether the hides are injured or not. Whether they are or not, Mr Barnes says buyers make no distinction between fire and fluid-branded hides.

Our conclusion is that the hot iron still gives most satisfactory results.

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